



ELECTRONIC TUBE REFERENCE

13E12

Power - Beam (NOT sweep) electronic tube

CONSOLIDATED TECHNICAL DATA

1 SECTION

CONSTRUCTION

BEAMPOWER

Industrial beam tetrode with center-tapped heater intended for stabilized power supplies, servo mechanisms, and related electronic control applications.

GENERAL CHARACTERISTICS

BASE DESIGNATION	—	BASE PINS	7
NOMINAL HEATER	26 V / 1.3 A	PARALLEL HEATER	13 V / 2.6 A
HEATING	Indirect	SERIES OPERATION	Capable
CATHODE ARRANGEMENT	Separate cathodes	SECTION CONSTRUCTION	Similar

SECTION RATINGS

SECTION 1 Beam Power	
PLATE RESISTANCE	110 Ω
TRANSCONDUCTANCE	0.025 S
AMPLIFICATION FACTOR	2.8
MAXIMUM PLATE VOLTAGE	800 V
MAXIMUM SCREEN VOLTAGE	300 V
MAXIMUM PLATE DISSIPATION	90 W
MAXIMUM SCREEN DISSIPATION	10 W
MAXIMUM GRID DISSIPATION	1 W
MAXIMUM CATHODE CURRENT	800 mA

13E12 — High-Power Beam Tetrode

The **13E12** is an indirectly heated beam tetrode designed for high-power applications requiring robust current delivery and high dissipation capabilities. Developed by Associated Electrical Industries (AEI)

under the Ediswan brand, this valve is primarily intended for use in series-regulated stabilized power supply units, servo-mechanisms, and other demanding industrial control circuits.

A defining feature of the 13E12 is its center-tapped heater, which allows for flexible power configurations, alongside its exceptionally high cathode current capability and low internal resistance when triode-connected.

Physical Construction and Heater Configuration

The 13E12 is housed in a large glass envelope with a maximum overall length of 140 mm, a maximum seated height of 128 mm, and a maximum diameter of 65 mm. The device has an approximate net weight of 5 ounces (with a packed weight of approximately 29 ounces). Because of its high power dissipation and physical structure, the tube must be operated in a **vertical mounting position**.

The heater is center-tapped, allowing it to be operated from either a 26.0 V or a 13.0 V supply. This flexibility is highly beneficial in industrial and military equipment where different supply rails are standard.

Heater Parameter	Series Connection	Parallel Connection
Heater Voltage (V_h)	26.0 V	13.0 V
Heater Current (I_h)	1.3 A	2.6 A
Calculated Heater Power	33.8 W	33.8 W

The cathode is an indirectly heated, unipotential type capable of supporting very high emission currents.

Base and Pin Connections

The 13E12 utilizes a specialized **B7A** seven-pin base. The base features an index boss to ensure correct orientation in the socket. When viewed from the free end of the pins (underside), the connections are assigned as follows:

- **Pin 1:** Heater (h)
- **Pin 2:** Heater Centre Tap (hct)
- **Pin 3:** Control Grid (g_1)
- **Pin 4:** Cathode (k)
- **Pin 5:** Screen Grid (g_2)
- **Pin 6:** Anode (a)
- **Pin 7:** Heater (h)

This pinout isolates the high-voltage anode (Pin 6) and screen grid (Pin 5) from the sensitive control grid (Pin 3) by placing the cathode (Pin 4) between them, which helps minimize internal feedback and leakage.

Absolute Maximum Ratings

The absolute maximum ratings define the extreme limits within which the 13E12 must be operated to ensure reliability and prevent premature failure. These ratings represent absolute values and should not be exceeded under any operating conditions.

Parameter	Symbol	Absolute Maximum Value
Maximum Anode Voltage	$V_a(max)$	800 V
Maximum Screen Voltage	$V_{[g2]}(/tubes/G2)(max)$	300 V
Maximum Control Grid Voltage	$V_{g1}(max)$	-100 V
Maximum Anode Dissipation	$P_a(max)$	90 W
Maximum Screen Dissipation	$P_{[g2]}(/tubes/G2)(max)$	10 W
Maximum Anode + Screen Dissipation (Triode Connected)	$P_{a+[g2]}(/tubes/G2)(max)$	95 W
Maximum Control Grid Dissipation	$P_{g1}(max)$	1 W
Maximum Cathode Current	$I_k(max)$	800 mA
Maximum Heater-to-Cathode DC Voltage (Cathode Positive)	$V_{h-k}(max)$	300 V

The high maximum cathode current of 800 mA and anode dissipation of 90 W emphasize the tube's suitability as a heavy-duty series regulator in power supplies, where it must pass substantial current while dropping significant voltage.

Triode-Connected Operating Characteristics

When configured as a triode (with the screen grid connected to the anode), the 13E12 exhibits extremely low internal anode resistance and high transconductance. These characteristics are ideal for low-impedance driver stages or series pass elements in regulators.

At the specified typical operating point, the triode-connected characteristics are:

- **Anode Voltage (V_a):** 150 V
- **Anode Current (I_a):** 500 mA
- **Mutual Conductance (g_m):** 25 mA/V (25,000 μ mhos)
- **Amplification Factor (μ):** 2.8
- **Valve Anode Resistance (r_a):** approximately 110 Ω

The exceptionally high mutual conductance of 25 mA/V combined with a very low anode resistance of 110 Ω allows the tube to respond dynamically to small grid voltage variations with large changes in plate current, which is crucial for maintaining tight regulation in stabilized power supplies.

Inter-electrode Capacitances

The inter-electrode capacitances of the 13E12 reflect its physical size and high-power design. The capacitances, measured without an external shield, are:

- **Control Grid to Earth (C_{in}):** 62.0 pF
- **Anode to Earth (C_{out}):** 17.0 pF
- **Anode to Control Grid (C_{a-g1}):** 1.0 pF

The relatively high input capacitance (C_{in}) of 62.0 pF requires a low-impedance driving source to prevent high-frequency roll-off or slow transient response in fast-acting servo-mechanisms or regulator feedback loops.

Technical Summary

The **13E12** is a high-power, vertically mounted beam tetrode featuring a B7A base and a flexible, center-tapped heater (26.0 V / 1.3 A or 13.0 V / 2.6 A). Engineered for heavy-duty industrial applications such as stabilized power supplies and servo-mechanisms, it offers an outstanding maximum anode dissipation of 90 W and a maximum cathode current of 800 mA. When triode-connected, the 13E12 provides a very low anode resistance of 110 Ω and a high mutual conductance of 25 mA/V at an anode voltage of 150 V and current of 500 mA. These characteristics make it an exceptionally robust and responsive control element for high-current voltage regulation.



SOURCE OPERATING CONDITIONS

[SOURCE PDF](#)

1961 AEI Industrial Valves

Published test conditions and operating points. Values on this page are preserved as reported by this source.

1961 AEI INDUSTRIAL VALVES

Section 1 · Beam Power

OTHER		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Maximum anode plus screen dissipation	95 W	TriodeConnection
Maximum heater-cathode voltage	300 V	CathodePositive

CAPACITANCE		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Control-grid-earth capacitance	62 pF	—
Anode-earth capacitance	17 pF	—
Anode-control-grid capacitance	1 pF	—



SOURCE OPERATING CONDITIONS

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1961 Associated Electrical Industries

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1961 ASSOCIATED ELECTRICAL INDUSTRIES

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